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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Seal for protective masks.**

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DE-A- 2 815 779
FR-A- 2 178 293
US-A- 3 545 436
US-A- 4 069 516

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Description

The present invention refers to a face seal for protective masks. A face seal comprising the features defined in the first part of Claim 1 is disclosed in US-A-3 545 436. The protective masks at present in use comprise a face-shield which acts both as support of the ocular surface and of the filter with which the mask is provided and as a seal on the user's face. The face-shield is made by a single piece of rubber which is sharpened at the edge in order to be particularly flexible and soft to adhere hermetically to the face with as much comfort as possible, acting as a seal. Far from the edge the rubber of the face-shield is on the contrary thick and presents a limited flexibility so that it supports rigidly the filter(s) and the ocular surface of the mask.

Therefore the face-shields of the current protective masks have to be realized trying to mediate the requirements of stiffness and of tightness and comfort which are obviously in contrast.

The object of the present invention is to provide a face seal associable to a face-shield, structured in whatsoever way, for protective masks, able to avoid the above mentioned drawbacks, namely to give the necessary tightness without weariness or inflammation of the circumferential portion of the face with which it interacts; said face seal is not affected by the deformations of the face-shield of the mask caused by the weight of the filter(s) and of the ocular surface.

Another object of the present invention is to allow many people to use the same mask reducing the number of the sizes necessary to satisfy a population of persons.

Such objects are achieved by a face seal for protective masks provided with a face-shield as defined in Claim 1.

The main advantages obtained by the use of such face seal on protective masks are the following:

- improved comfort of use of the mask with the highest guarantee of tightness;
- reduction of the number of necessary sizes with consequent standardization of the production of the masks;
- possibility to make the face seal by a type of rubber or other materials which privilege the characteristics of anti-allergy and softness in respect to those of durability, being possible to replace periodically and easy the possibly worn face seal with another one.

The invention is illustrated, just for exemplification but not in a limitative manner, in the figures of the attached tables where:

- fig. 1 is a front view of the face seal mounted on a face-shield of the rigid type of a protective mask;
- fig. 2 is a cutaway view taken along the line II-II of fig. 1;
- fig. 3 is a section executed along the line III-III of fig. 2.

With reference to the above mentioned figures the face seal, generically quoted as 1, presents an annular development which allows it to anchor to an edge 2 of a face-shield 3 for instance of rigid type.

The face seal 1 comprises fitting means cooperating with the edge 2 and tightness means operating between said edge 2 and the user's face (not shown).

The tightness means of the face seal comprise a bellows 4 in which a first 5 and a second 6 annular foil are reciprocally hinged along an annular edge 7 so that they form between themselves an angle "alpha" with concavity towards the interior of the face-shield 3.

The amplitude of the angle "alpha" is almost constant over the whole development of the face seal 1 close to the edge 2 of the face-shield 3, whereas the position of the whole of the two annular foils 5 and 6 with reference to the fitting means (and therefore to the edge 2 of the face-shield 3 included inside said means) is not constant. This is due to a connecting baffle 8 which reaches its largest extension at the top of the face-shield decreasing gradually up to disappear in the median and lower zones of the face-shield (see section III-III of fig. 2).

The second annular foil 6 extends itself to form a chin-latch by the lower part of the face-shield.

The means for the fit of the face seal 1 to the edge 2 of the face-shield 3 comprise a couple of annular flaps (internal 10 and external 11) joined together to form a U-shaped structure fitted on the edge 2 of the face-shield 3.

The external flap 11 is pressed against the edge 2 by a metallic hooping 12 made, according to the requirements, even by many pieces and cooperating also with a step 13 associated to said edge 2.

The face seal 1 can be fitted, with all the related advantages, also to a soft face-shield with the sole condition that the edge 2 is rigid and therefore independent from the means which fit it to the face-shield 3.

Wearing a mask provided with the face seal 1, the second annular foil 6 comes in contact with the user's face (not shown) and rotates elastically around the annular edge approaching the first foil 5. The concave angle "alpha" between said foils reduces itself till the elastic force generated by the face seal 1 balances the elastic force produced by the means of fit of the mask to the user's head (not shown); said means are usually formed by elastic

belts connected directly to the face-shield 3 of the mask.

Where the force produced by the means fitting the mask to the user's face is greater, the connecting baffle 8 is present and cooperates to balance said force by its deformation.

It is obvious that the rotation of the second annular foil 6 around the annular edge 7 with reference to the first annular foil 5, with the consequent approaching of the two foils forming the bellows 4, is also influenced by the dimensions of the user's face, which can vary without the arising of tightness problems.

Claims

1. Face seal for protective masks with face shield, comprising annular flaps (10,11) fastenable onto an annular edge (2) of the face shield (3) and connected to first and second annular foils (5 resp.6) hingedly connected together along an annular edge (7) of the face seal (1) to form a bellows arrangement, wherein said foils (5,6) form between each other an acute angle (α) and said second foil (6) extends in the lower part of the face seal (1) to form a chin-latch (9), characterised in that said annular edge (7) of the face seal (1) is disposed at the side of the face seal (1) that is opposite to the face shield (3) and the acute angle (α) opens toward the interior of the face shield (3), whereby the second foil (6) extends from said annular edge (7) toward the interior of the face shield (3).

2. Face seal according to claim 1, characterised in that the acute angle (α) has a substantially constant amplitude over the development of the annular edge (7) of the face seal (1).

3. Face seal according to claim 1 or 2, characterised in that between the flaps (10,11) and the first annular foil (5) there is provided a connecting baffle (8) having a largest extension at the top portion of the face seal (1) and a gradually decreasing extension disappearing in the median and lower portions of the face seal (1).

Revendications

1. Joint d'étanchéité facial pour des masques de protection munis d'un écran de protection facial, comprenant des rebords annulaires (10, 11) pouvant être fixés sur un bord annulaire (2) de l'écran de protection facial (3) et relié à des première et seconde ailes (5 et 6 respectivement) articulées l'une sur l'autre le long d'un bord annulaire (7) du joint d'étanchéité facial (1) de manière à former un agencement de soufflet, dans lequel lesdites ailes (5, 6) forment entre elles un angle aigu (α) et la seconde feuille (6) s'étend dans la partie inférieure du joint d'étanchéité facial (1) de manière à former une mentonnière (9), caractérisé en ce que le bord annulaire (7) du joint d'étanchéité facial (1) est disposé sur le côté de ce joint d'étanchéité facial (1) qui se trouve à l'opposé de l'écran de protection facial (3) et l'angle aigu (α) s'ouvre en direction de l'intérieur de l'écran de protection facial (3), grâce à quoi la seconde aile (6) s'étend depuis le bord annulaire (7) en direction de l'intérieur de l'écran de protection facial (3).

2. Joint d'étanchéité facial selon la revendication 1, caractérisé en ce que l'angle aigu (α) a une valeur sensiblement constante sur l'ensemble du bord annulaire (7) du joint d'étanchéité facial (1).

3. Joint d'étanchéité facial selon la revendication 1 ou 2, caractérisé en ce qu'entre les rebords (10, 11) et la première feuille annulaire (5) est disposée une paroi de raccordement (8) ayant la plus grande largeur à la partie supérieure du joint d'étanchéité facial (1) et une largeur diminuant progressivement jusqu'à une valeur nulle dans les parties médianes et inférieures du joint d'étanchéité facial (1).

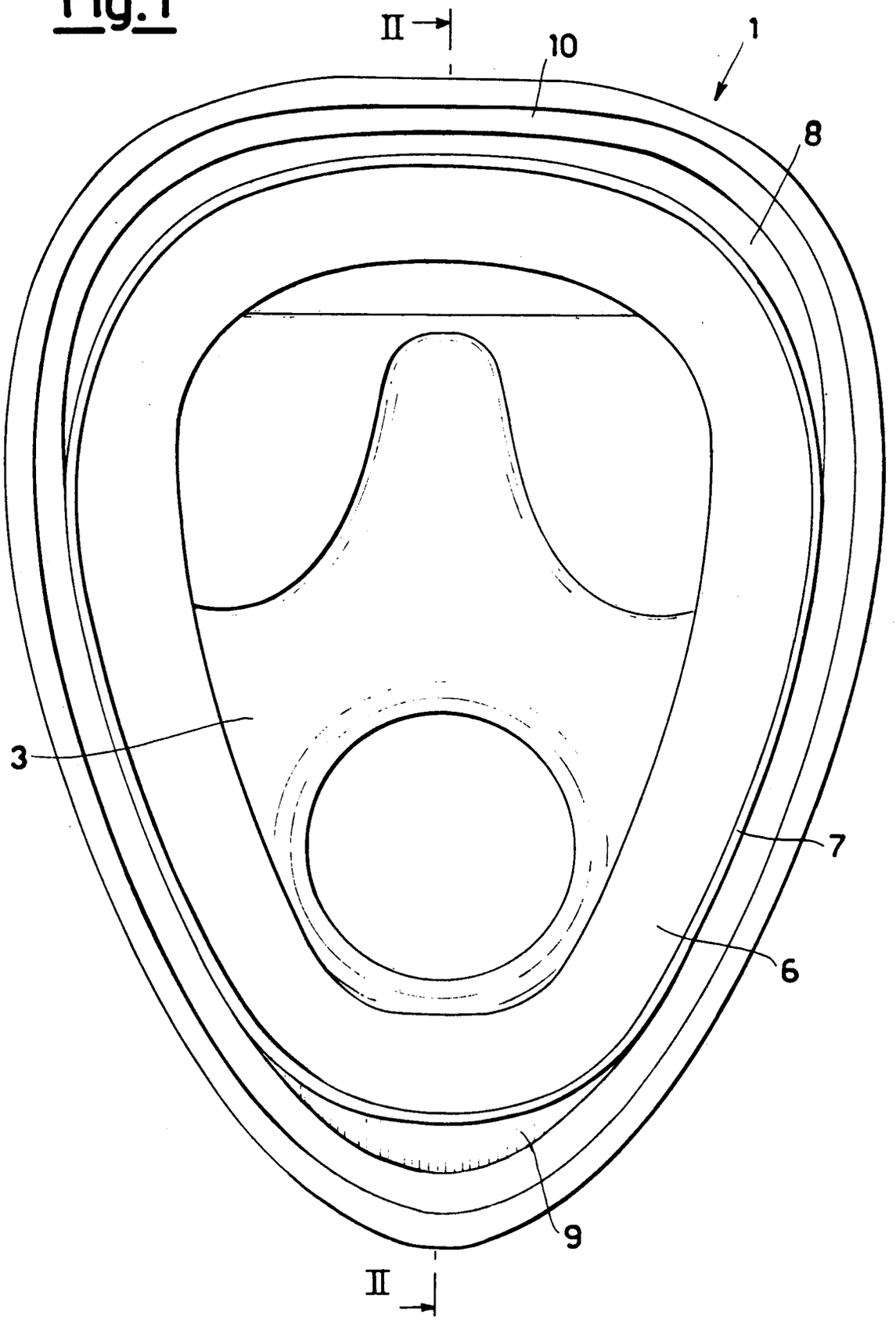
Patentansprüche

1. Gesichtsabdichtung für Schutzmasken mit Gesichtsschild, mit ringförmigen Klappen (10, 11), die an einem ringförmigen Rand (2) des Gesichtsschildes (3) befestigbar und mit einem ersten sowie einem zweiten ringförmigen Flügel (5 bzw. 6) verbunden sind, welche entlang einer ringförmigen Kante (7) der Gesichtsabdichtung (1) miteinander gelenkig verbunden sind, um eine Balgenanordnung zu bilden, wobei die Flügel (5, 6) zwischeneinander einen spitzen Winkel (α) einschließen und der zweite Flügel (6) sich zur Bildung einer Kinnrast (9) in den unteren Teil der Gesichtsabdichtung (1) erstreckt, dadurch gekennzeichnet, daß die ringförmige Kante (7) die Gesichtsabdichtung (1) auf der dem Gesichtsschild (3) gegenüberliegenden Seite der Gesichtsabdichtung (1) angeordnet ist und der spitze Winkel (α) sich gegen das Innere des Gesichtsschildes (3) öffnet, so daß der zweite Flügel (6) sich von der ringförmigen Kante (7) gegen das Innere des Gesichtsschildes (3) erstreckt.

2. Gesichtsabdichtung nach Anspruch 1, dadurch gekennzeichnet, daß der spitze Winkel (α) über den Verlauf der ringförmigen Kante (7) der Gesichtsabdichtung (1) im wesentlichen konstante Größe hat.

3. Gesichtsabdichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß zwischen den Klappen (10, 11) und dem ersten ringförmigen Flügel (5) ein Verbindungssteg (8) vorgesehen ist, der eine breiteste Erstreckung am oberen Teil der Gesichtsabdichtung (1) aufweist und mit allmählich abnehmender Erstreckung im mittleren und unteren Teil der Gesichtsabdichtung (1) verschwindet.

Fig.1



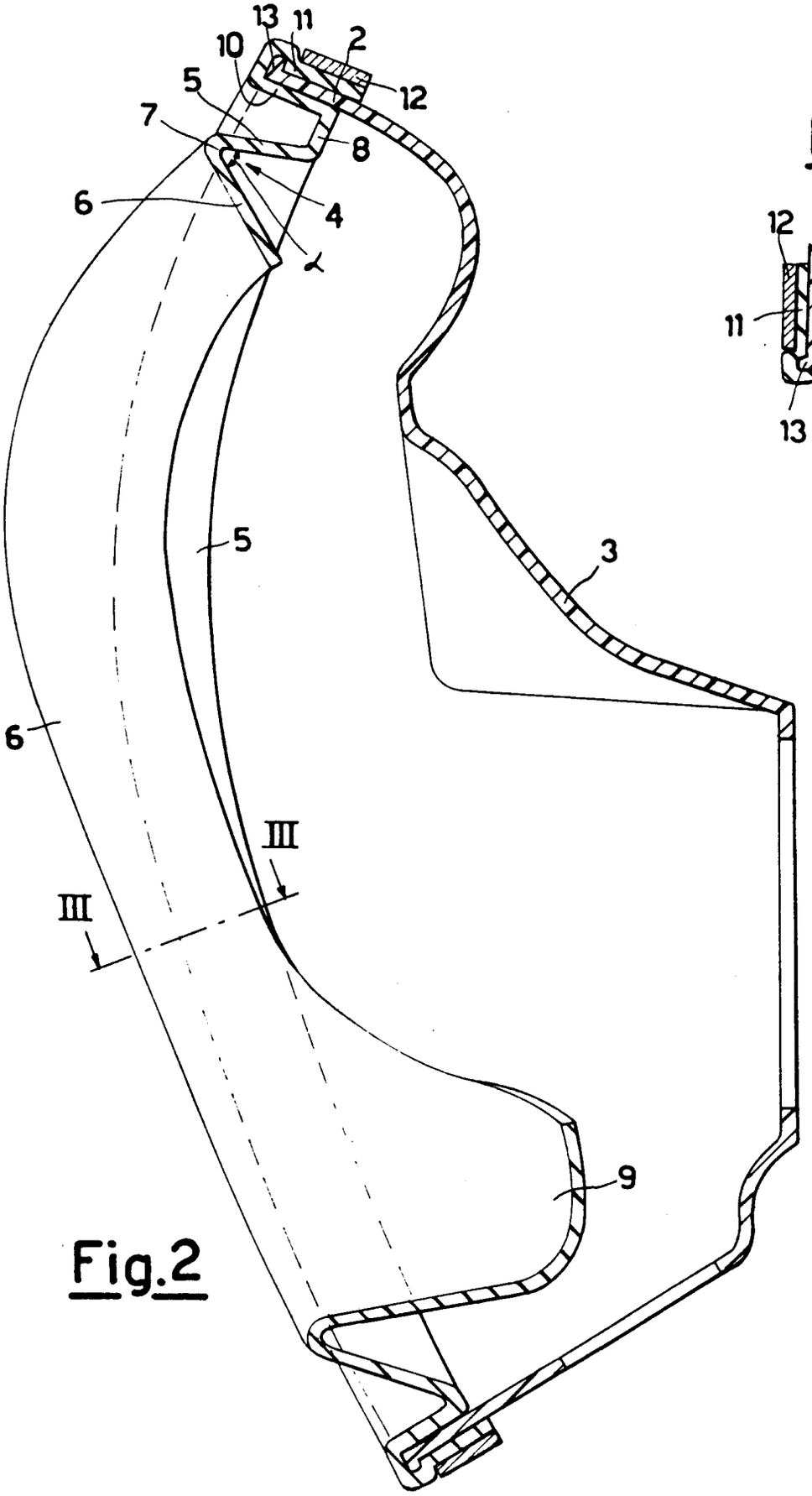


Fig.2

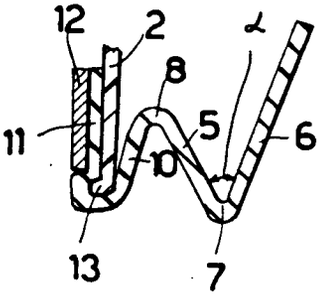


Fig.3